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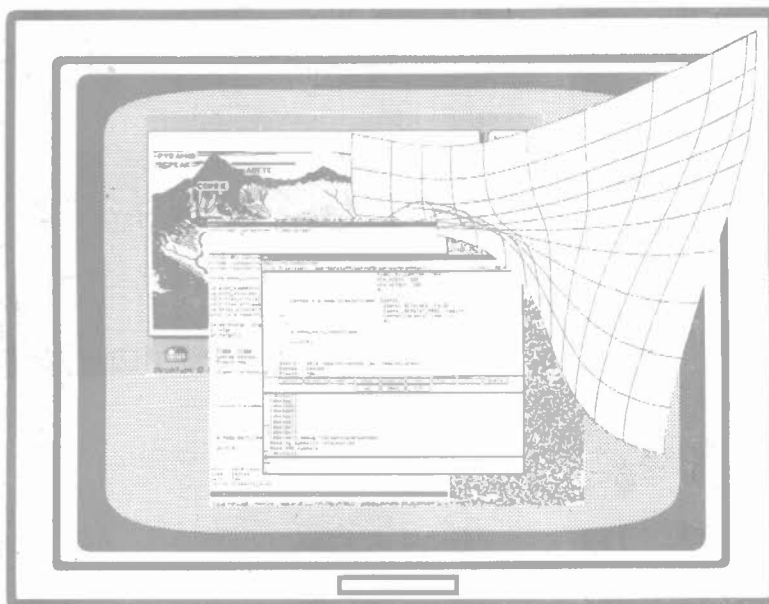
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LANGUAGE TRAINING FOR VARIOUS PURPOSES IN SEVERAL LANGUAGES ON A COMMON HYPERMEDIA FRAMEWORK

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Abstract—The principal aim of the CAMILLE project is the development and delivery of hypermedia courseware in Dutch, Spanish, French and English. It encompasses the training of general linguistic competencies for beginners (Dutch and Spanish) as well as competencies related to the use of language for specific purposes (French and English). The target audiences include students in science or business, or technicians or engineers from SMEs. In order to achieve its goals, the CAMILLE project (computer-aided multimedia interactive learning environment) is building on the expertise gained at the University of Teesside during the development of its hypermedia course in basic French, France InterActive, described in detail elsewhere. It consists of ten modules, each composed of four 1-h units which exploit extensively the interactive voice of both sound and video. Furthermore, hypertext has been used on a software engineering level to integrate the multimedia resources and on a pedagogical level to balance tutor- and learner-controlled navigation through the software. A basic premise is that France InterActive would provide the CAMILLE project with a state-of-the-art hardware/software platform upon which to construct its courseware.

INTRODUCTION

The use of an existing piece of software as a template for multinational and multilingual courseware development has thrown up some interesting questions and problems.

Firstly, using France InterActive as a template for basic Dutch and Spanish courses which have similar linguistic goals raise the issues of:

the portability of hypermedia methodology between languages
what, for a given target language, needs to be changed or added to take account of learners' previous linguistic experience in different source languages.

Secondly, using France Interactive as a template for an intermediate course in French for Specific Purposes ("Working in France") which has different or additional linguistic goals has already compelled us to modify the original framework to encompass new kinds of man-machine interactions and new pedagogical requirements.

Finally, the CAMILLE project has shown some of the problems involved in transnational courseware development, e.g. scripting and shooting being done in different countries, and software assembly in others.

Before discussing the nature and potential of the CAMILLE platform, we should define our terms. For present purposes, multimedia should be taken to mean a computing resource capable of displaying textual data, graphical data (still or animated), photographic data (still or moving), and of recording and playing back sound data. These various data types may be displayed simultaneously or sequentially depending on the needs of the resource, but it seems likely that most large-scale systems will provide multiple data windows and that these windows should be capable of displaying differing data types.

How this data is accessed, however, leads to the second important concept, hypertext. Hypertext refers to a system of accessing textual data in which the data is not stored in any particular sequence. The data must, of course, be stored in an orderly manner, but this should not dictate the order in which it is accessed. Ultimately, of course, the data is accessed sequentially, but the

sequence is determined by the end user rather than by the original author. As such, hypertexts are usually understood to be very open data structures which the user is free to explore at will.

Combining the openness of hypertext with the data richness of multimedia creates hypermedia. That is, a media-rich data environment in which one can move freely from pictures, to video, to sound, to text or any combination of these in a sequence determined by the user.

One of the great advantages of such systems is that they permit users to follow their own train of thought, clarifying issues as they occur to them rather than as they occurred to the authors. More traditional CALL systems tend to be based on a programmed learning approach. They are structured in a tree-like manner in which progress through the lesson is determined by the choices a learner makes at any given moment. Each choice sends the user down a particular branch of the information available and excludes them from others. They may, of course, retrace their steps along their chosen path and then choose another, but while they are on one path they cannot easily access information which is contained on other branches of the knowledge tree. This means that the lesson planners or programmers have to ensure in advance that the learner has already acquired all the information needed to make each new choice. Unfortunately, in a knowledge domain as complex as language, it is almost impossible to plan in advance for all eventualities. In hyper information systems this is unnecessary, because the user can move from any point in the system to any other at will. If, for example, a learner is engaged in an exercise and needs some grammatical information before making some particular choice, one can, in principle, move directly to that information, then on to a dictionary then to a video clip and then back to the point of choice. However, this freedom of movement, or "navigation", poses its own problems—most commonly the problem of becoming disoriented. As users pursue their train of thought and one question leads to another they may easily lose sight of the original question and become confused or disillusioned. To understand the potential severity of this problem in educational terms, giving someone unguided free access to a large hypermedia data base would be rather like taking a student to a library and telling them to educate themselves. The persistent might, but the others ...?

Countering this problem has been a major issue for educational courseware developers; most of them seem to have devised solutions similar to those developed in CAMILLE. On the one hand, great care is taken to "signpost" the user's current position and relate it to some specific central location; on the other, data resources are not presented as homogenous, commonly being divided into lesson materials and reference materials.

THE BASIC CAMILLE TEMPLATE

The template for CAMILLE is a self-contained, computer-mediated learning resource in which the lesson materials take the form of some 40 h of multimedia exercises and activities that are both highly structured and highly interactive; while the reference materials include a grammar book, a speaking dictionary, a book about the target culture, a book about linguistic functions, and a notebook for the user's own use, all of which are accessible at any moment during the user's interaction with the system. With the exception of the future tense, the course provides an opportunity to acquire all the skills normally associated with a threshold level of competence. It is aimed at well-motivated adults (the present course material assumes professionally oriented adult learners, but the technology could easily be applied to younger learners and advanced students), who may or may not be engaged in formal education and who may or may not have access to a tutor (the system was designed to support learners who have no access to a tutor. However, given the current limitations of machine intelligence, regular contact with a live tutor cannot but enhance the learning experience). However, it is assumed that they are motivated by professional as well as leisure needs. Its functional content ranges from the general skills needed to survive, obtaining food, shelter and information, to what may loosely be described as "business" skills, using the telephone, making appointments, writing a business letter.

This content in turn determined our basic pedagogic approach, which, in general terms, may be described as encouraging the acquisition of a "communicative competence" in a language, by



which we mean acquiring the ability to use language to do things. Thus from the start, the target language is used as the primary language of communication between the computer and the student (help in the user's first language is available, but access to it is through the target language, French). Consequently, the activities we have created not only encourage the acquisition of "real-world" competencies, but also require the student to use the target language in order to meet the immediate goal of undertaking the exercise. This may be as simple as understanding some instructions in the target language about what to do next or as complicated as playing and recording a role in a dialogue.

However, the adoption of these goal-directed learning strategies does not mean that we have eschewed the teaching of grammar or the exploitation of the computer's ability to engage the student in the sort of "drills" that can reinforce the acquisition of certain linguistic elements. The development of a flexible linguistic repertoire demands the acquisition of some template for usage, some "grammar", that permits the use of previously acquired knowledge in novel situations. Similarly, certain linguistic skills can only be acquired with a great deal of practice and true linguistic competence is only achieved by regularly using the language accurately to do something. To this end we have embedded a variety of goal directed learning strategies in a media-rich electronic information environment that supports the study of the target language. The notion of support is crucial here. CAMILLE is a learning not a teaching resource. The objective is not to "teach" but to construct an environment that provides students with all the tools and information, short of a live teacher, that they might need to undertake a language course. An analysis of existing practice in conventional "tutor-led" courses[1] led us to the view that such tools and information would normally include some or all of the following: a textbook of learning activities, a grammar, a dictionary, audio- and video-recordings and, very frequently, the interactive functionality of a traditional language laboratory. In addition to these, information about the "cultural embedment" of the language was normally provided by the tutor/or some or all of these sources. The problem was how to make all these varied resources available to the student in an intelligible and easy to use manner. The solution lay in the adoption of the principle of "multi-windowing" to display information and the "electronic desktop" to organize its presentation.

When the user enters the CAMILLE environment the screen may be understood to represent a desktop on which a textbook lies open at the table of contents. Surrounding this textbook are button icons representing the reference materials. From this desktop the user may move to any point in the textbook by selecting the appropriate item in the table of contents or may choose to open any of the reference sources. Since the object of these hypertext-reference books is to supply the user with information on demand, they may be accessed at anytime during the course. When the user selects one of the reference sources, it is opened as a separate window of information on the desktop. All the reference books may be open at the same time without completely covering the textbook, but the result is a very cluttered desk. Keeping the textbook in view is important, because it not only supports the bulk of the user's activity, but also helps to maintain some orientation in the information "hyperspace". Furthermore, although the reference materials contain all the information needed to acquire the desired level of competence, they offer little guidance on how to acquire it.

This guidance is found in the lesson materials. Although each unit is self-contained, focusing on a particular set of related communication skills, they are not totally independent and cannot be approached as a pick and mix collection of linguistic functions to be studied in any order. Rather they are organized into a course of study. Each new unit and module builds upon the grammatical and lexical content of preceding ones. Consequently, while it is possible for suitably competent learners to begin the course at various points, it is expected that they would thereafter follow the course as designed. Since very few Anglophones are genuine "beginners" in French, the content of Module 5 is currently being modified to provide a set of pre-tests, which will allow users to assess the appropriate point of entry to the course for them. Within each unit, however, there is considerable freedom of choice over the exact order in which particular activities are undertaken. Moreover, it should be noted that the underlying hypertext structure of the data does make it possible for a user to move from one unit to another during a given session. For example,

a student may, while doing one exercise, look up something in the grammar and from there choose to undertake an exercise designed to reinforce that point before returning to the original exercise. These activities are normally organized around an "introductory" video sequence which focuses on specific linguistic skills. These skills are further explored and developed in a series of activities and exercises designed to aid in their acquisition. Consequently, the student is strongly encouraged, though not compelled, to watch the video before attempting the exercises. The user is not compelled to begin with video because, as will appear later, there are many routes into a unit and, for at least some of these—e.g. returning to an uncompleted unit—being compelled to watch the video might be more of an obstacle than an aid.

Within the basic CAMILLE template a unit normally contains some six activities or exercises in addition to the initial video. The video itself is used for aural comprehension tests and quizzes while its transcript is used directly for subtitling and activating the video by sentence and, later, more interactively for reading, gapfill/cloze and grammar exercises. Activities/exercises are grouped under the three headings of grammar, function and lexicon depending on their primary focus. The distinction between an activity and exercises or drills is important because it indicates some of the progress that has been made in the field of CALL in recent years. As a general rule, exercises/drills tend to be limited repetitive activities designed to provide practice with some very particular skill such as counting or recognizing numbers. An "activity" is less limited in scope and demands a response from the learner which is more reflective than reflexive. Thus CAMILLE contains some interactive audio, role-playing exercises which invite the learner to use numbers within the functional context of acquiring goods or services. It is these more open-ended activities which are the hallmark of recent developments in CALL.

In part because the team adopted a deliberately eclectic approach to the creation of learning activities, it is difficult to list the full range of possibilities that are available to the learner within CAMILLE. Among the more interesting, however, are a larger number of role-playing exercises which exploit both interactive video and interactive audio. In these exercises, the student is invited to adopt the role of one of the interlocutors in a dialogue and participate, by recording their own utterances, in the creation of a new dialogue which can then be played back and compared with a pre-recorded example. The role of the other interlocutor is also executed by means of pre-recorded audio or video utterances. The student is prompted and can, if necessary, gain access to pre-recorded models, but the objective of the exercise is to engage the student in the simulation of real-life situations. Given the limits of machine intelligence, such exercises require a great deal of good faith and co-operation on the part of the student but, given intelligent participation in the activity, much seems to be achievable.

In addition to the old favourites like cloze exercises and word squares, there are exercises that permit practice with word-order and lists of keywords and phrases with their English equivalents in every unit. These latter are also sound enhanced to provide pronunciation practice and can be scrambled so that the students can quiz themselves. Still more significantly, almost every activity in CAMILLE/France InterActive[2,3] is sound- or sound- and video-enhanced. The software not only exploits pre-recorded audio or video, it also provides facilities for the student to record and playback their own utterances. Because these facilities are available throughout the course they provide an enhanced version of the functionality of traditional language. Furthermore, they not only provide support for formal exercises but are also available on an *ad hoc* basis, so that the student can practice, e.g. pronunciation, on demand.

CAMILLE AS A MULTILINGUAL PLATFORM

As a consequence of the development of the CAMILLE resource out of an existing course, one of the issues immediately facing the Consortium was the question of how far CAMILLE really was capable of supporting the development of courseware for languages other than French and at levels other than beginner. Of course, there was never any question of simply translating France

InterActive, but if the CAMILLE resource was to be valuable it needed to provide a detailed and viable template and a set of easy-to-use tools that could be applied across a variety of languages.

The Consortium is only 9 months old at the time of writing but, to date, the indications are very encouraging. Perhaps, unsurprisingly, the development of a beginners course in the highly cognate language of Spanish, *España InterActiva*, appears to offer the fewest problems. Indeed, most of the structures and many of the exercises really do seem to be translatable. Nevertheless, there are significant differences between the languages, and these are leading to some important re-thinking of the materials: most obviously, the existence of two verbs "to be", "ser" and "estar," in Spanish and the need to teach them early in the course means that the Spanish course will have to have a slightly different structure from the French.

More surprisingly, current indications are that the CAMILLE resource will also provide an adequate platform for developing a beginners course in the far less cognate language of Dutch. From the standpoint of CALL, however, one should perhaps not over emphasize the difference between Dutch and the Romance Languages. Like most of them and unlike German, for example, declension does not play a major role in Dutch. Accordingly, it may prove that when the Consortium turns its attention to other Germanic languages more problems will emerge. It would appear that *Interactief Nederlands* will also be able to exploit the model and many of the exercises in *France InterActive*. The greatest modifications relate to the grammatical problems of conjugation and word order and more time is spent at the start on orthography and pronunciation. But the functional approach, with a fairly standard grammatical underpinning, seems to be transporting well at this level. While lexicon and grammar are clearly radically different from one language to another, linguistic functions like greetings, writing letters or even more complex activities like seeking a job persist from one linguistic environment to another.

There is another issue related to the transnational utility of a courseware development platform like CAMILLE on which the project hopes to shed some light. Even if the target languages can be approached in a broadly similar fashion, what about the target audience? Will the same course be equally effective in different countries? There are plans in both Holland and Spain to use *France InterActive* as it stands to support the acquisition of French by English-speaking Dutch and Spanish learners. Similarly, the Spanish members of the Consortium are also hoping to make *España InterActiva* more readily accessible to learners with varied first languages than is *France InterActive*.

LANGUAGE FOR SPECIFIC PURPOSES

It does appear that as one moves to another language level or purpose there is a greater need to alter the CAMILLE template. Accordingly, the use of the platform for developing courses in French Special Purposes (FSP) is generating a range of significant changes. Differences in target audiences entail different learning principles and this has required alterations to the CAMILLE template which affect general and intermediate levels of organization (modules, units and general resources) as well as a more overt shift from exercises/drills to activities.

The FSP modules being developed at Clermont-Ferrand, *Travailler en France*, is aimed at non-beginners who are students of economics or business or employees of SMEs. They will have studied French to at least intermediate level and from a professional viewpoint will have experienced or be aware of professional life in their own country and have a clear business or economics background.

The course combines linguistic and professional goals on the one hand and knowledge and know-how on the other[4]. There is a greater emphasis on activities and problem-solving than in the basic courses and the focus is on communicative strategy and know-how rather than on knowledge. This means that equal weight is given to formal linguistic competence, e.g. professional

vocabulary, paralinguistic competence (gesture and behaviour) and socio-cultural competence (an understanding of the broader context of French professional life). The socio-cultural element cannot be neglected because it has often been observed that a lack of sensitivity to cultural differences between natives and non-natives often leads to a serious degradation of the communication process as well as breakdown in professional relationships. These competences have to be combined to complete certain defined tasks effectively and efficiently.

The pedagogical approach is based on assumptions common in the teaching of Languages for Specific Purposes[5]. For example, considering language learning as a decision-making process, not just as a matter of linguistic knowledge since the learners are already specialists in their own fields, relying on learners first language experience (they are already language users); considering learning as partly incidental (language can be learned when solving a problem not directly related to language as such). Consequently the knowhow aspects of acquisition is more prominent than knowledge/competence. But, the balance between specific professional purposes and more general purposes cannot be ignored. Even though all the linguistic activities are apparently focused on the French business world, they remain a subset of general linguistic competence and performance. For example, basic human interactions such as introductions, farewells and small talk are important in any context. In other words, Language for Specific Purposes is only another way of achieving language acquisition. But the shift in emphasis has required some changes to the basic CAMILLE template.

GENERAL ORGANIZATION

The emphasis on problem-solving and the greater complexity of the tasks has forced us to abandon the incremental approach of the basic template. Before a specific task can be successfully completed, the learner needs a wide range of specific knowledge and skills related to that task and then needs time to solve problems and complete the practice procedures. Each module contains all the information required by the learner and can be taken in any order. Hence the average time required to complete a module is between 15 and 20 h, rather than 4. A further effect of this problem-solving approach and the performance of relatively complex tasks is that the activities need to be more open-ended and the learner has to take more initiative. Interactive activities give the learner more choices and there is now an evaluative element which the original template for interactive video lacked.

The evaluation of open-ended activities is far more difficult than marking a formal vocabulary or grammatical exercise. Evaluating an activity means identifying the criteria of success and failure relevant to the task. To some extent, it implies representing explicitly in the computer extralinguistic expert knowledge that will let the machine handle the interaction with the learner. Since learning a language is more incidental within this perspective, direct evaluation of linguistic ability is extremely difficult. Nevertheless, each learner needs some feed-back on their linguistic and decision-making abilities, especially in a complex situation such as a role-playing interactive simulation. For instance, if each learner has to play the role of an applicant in an interview with a personnel manager, they choose a character who will have been presented on video in the preceding units. The system then displays all the criteria by which the dialogue will be evaluated. Some criteria belong to the personnel manager (presentation, verbal expression, ease, vitality, motivation, etc.), others to the applicant (obtaining more information on the post, negotiating the salary, etc.). During the interview the video displays only the manager. After every utterance by the manager, each learner selects a written answer from a limited set, listens to the corresponding native pronunciation and records oneself. This selection is assessed by the system which determines the manager's response. The dialogue being dynamic, different paths and endings are possible depending on the learner's choices. When it ends, the learner can then replay the full dialogue made up of one's recordings coupled with the video. Then the system asks the learner to self evaluate and displays its own evaluation. From the marks generated by the different criteria the learner can estimate how successfully the task was fulfilled.

The foregoing discussion of differences between the France InterActive and Travailler en France frameworks should not obscure the similarities. From a software engineering and a technical viewpoint both projects are strictly similar. Collaborative work has made it possible to enhance some of the concepts introduced in France InterActive and to extend computing and hypermedia facilities to offer the learner a still more active role. In Travailler en France the notebook, linguistic functions, grammar, dictionary books are very similar to those in France InterActive. Indeed, thanks to hypertext modularity, it is possible, for instance, to reuse the dictionary directly and just add specific professional vocabulary. FSP may require extra contents and functionalities in some of the books but the principles adopted for the basic template remain unchanged. Next year the portability of Travailler en France will be tested in different countries and when the consortium begins work on an English for Special Purposes course. It is our expectation that exporting the model to other languages will prove no more problematical than exporting France InterActive to Dutch and Spanish.

MANAGING MULTI-NATIONAL MULTIMEDIA PRODUCTION

As is no doubt obvious from the preceding section, the development of multimedia learning resources requires a wider range of skills and expertise than any individual can realistically be expected to possess. Consequently, the establishment of teams of developers would seem to be a requirement for effective multimedia courseware production. Furthermore, in the field of CALL, it seems likely that such teams will also be multi-national. For example, if audio and video materials are to be genuine, they must be produced by native speakers and preferably by native speakers in the target language environment. This can, of course, be achieved by taking a film crew and group of native speakers to their country of origin and producing the data. In effect, this is what was done in producing France InterActive. Obviously, however, it is much easier and more efficient to have this production work done by groups of people who are permanently residents in the country of origin and this is what is being done in the CAMILLE project. Teams have been established in France, Holland, Spain and England each of which provides linguistic realism in their own language for the others to use in exploiting the CAMILLE platform to produce language learning resources. However, the establishment of such teams of multi-national collaborators creates its own problems; problems that can be discussed under the two headings of communication issues and technical issues.

COMMUNICATION ISSUES

Most of the following communication issues are obvious, but they are of such importance that they are worth mentioning. For example, although electronic communications of one kind and another do much to speed up contact between partners, they do very little to speed the workings of the bureaucracies, internal and external, which inevitably intervene in the development process. In our experience, where agreements between partners, e.g. concerning the disposition of funds, require ratification by local, e.g. university, bureaucracies a time lag of anything up to 3 months or more between the team's agreement and its ratification may ensue. This is not intrinsically a problem, but it does require considerable forward planning and long lead times.

More serious are the related issues of documentation and version maintenance. In the field of CALL relatively few developers are software engineers by profession and, consequently, have not acquired the habits of good software production. Accordingly, it is very easy for teams to produce valuable, user-friendly tools for courseware development, whose value is lessened simply by the fact that the tools are inadequately documented. To some degree, the developers of France InterActive were guilty of this. Although the template itself is extremely easy to use, the instructions for its use were less than adequate and this caused some unnecessary delays. These were largely overcome by the inclusion of training sessions for the individuals principally charged with the implementation of the new courseware. These training sessions were planned as part of the CAMILLE project anyway and other similar developers would be well-advised to include such

sessions in their planning. Nonetheless, the need for clear accurate documentation of the software is crucial to the efficient running of a transnational development team. Such practice is still more important in the area of version maintenance where it is not only necessary to document changes accurately, but also to communicate those changes to the rest of the team quickly and regularly. Obviously, maintaining fast, effective communications within any team is crucial and the more geographically disparate the members of the team, the more difficult it is to maintain effective contact. However, in this era of electronic communication these problems ought to be minimal. It should be possible to transfer even very complex data relatively quickly and easily by purely electronic means, and one of the project's aims was to see just how far this could be exploited. In our case, two problems were encountered. Initially not all the partners were using the same international network and files were constantly being corrupted as they were switched from one network to another. Secondly, internal networks within universities are not always capable of handling complex multimedia files which can cause frustration and delay.

TECHNICAL ISSUES

Responding to these communication problems revealed some unexpected technical problems. Since we did not wish to rely entirely on Internet and we needed some kind of local backup system, the acquisition of compatible tape streamers by all the members of the Consortium seemed a reasonable way forward. It would facilitate both the storage and transmission (by post) of large quantities of data. However, acquiring the same tape streamer in each of the four participating countries proved to be difficult and even when they were acquired different machine configurations from one site to another generated problems. Indeed, this proved to be true with not only a number of other hardware items, but also with third-party software, where different versions were available in different countries. In the end, problems of machine compatibility proved to be so great that the consortium was forced to the conclusion that in future it might well be necessary not only to articulate hardware/software configurations, but for a single partner to make acquisitions on behalf of all consortium members and to undertake distribution ourselves. The real issue here is that, as yet, it seems likely that, the MPC standard notwithstanding, the trans-national distribution of multimedia courseware may not prove as trouble-free as one might have supposed. One example of this calls attention to another technical issue that deserves some consideration. In an effort to exploit the MPC standard, CAMILLE decided to move to .WAV files for the storage and retrieval of audio data and we all bought what we thought were the same 16 bit sound cards. In the event, it turned out that half of us had cards which would record at 16 bits per channel while the others could only record and play back at 8 bits per channel. We have yet to decide which standard to go for. At the present moment, 8 bit cards far outnumber the higher quality 16 bit cards, but for how long?

Of course, working in the field of multimedia one must expect the technology to move on and one cannot always expect backwards compatibility. At least one cannot, if quality is a serious consideration. One only has to consider the limitations imposed on the whole DOS environment by the quest for backwards compatibility. However, this does remind one to make a serious assessment of what the delivery technology is likely to be when the courseware is finished. If one aims at today's technology it will go out of date during the development life-cycle of the courseware but if one constantly chases the state of the art, there is a risk of either becoming involved in an unending revision cycle or producing software that requires a prohibitively novel or expensive delivery platform. What is needed is to work towards some reasonable assessment of the technology most likely to be dominating the market at the end of the development cycle.

Perhaps even more importantly, this quandary argues a very strong case for producing and maintaining all audio and video data in a machine-independent format. Audio-video production is one of the most time consuming and expensive parts of multimedia authoring; and it is tempting to short-circuit this process by exploiting modern technology to produce digital sound and video files directly in the computer environment. This, however, is probably a mistake. Direct digital

production is likely to tie the developer to a specific hardware/software delivery platform and this platform may, as the SoundBlaster 16 story indicates, rapidly become out-dated. It is better to produce and store all sound and video on traditional tape media. In this way, if the technology moves on, it is possible to move with it. There will be some necessary re-programming, but that activity is trivial in comparison with the task of reproducing the original audio or video materials.

CONCLUSIONS

It will be clear that the project has so far given us cause for optimism on the question of portability and the use of standardized templates. But the proof of the pudding is in the eating and the fundamental issues relating to the use of modern technology in language teaching have not yet been widely addressed. We will not be able to take a position to view for another year.

From a pedagogical viewpoint, hypermedia technologies are often presented as an opportunity to enhance language learning: they endow the previously restricted computing environment with extra channels of communication; they increase possibilities of interaction and they give the learner more control. Although these factors are often assumed to play an important role in the acquisition process, there is as yet little evidence either to support or to refute the assumption. The CAMILLE project offers an opportunity to undertake such an examination in a multi-cultural environment.

From a software engineering viewpoint, hypermedia programming tools are often advocated as an opportunity to speed up courseware development, and hence to make CAL a realistic support for trainers and teachers. But hypermedia production requires a wide range of skills and up to now our experience in re-using software modules for large scale software is still very limited[6].

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